

## RESPONSE AND REQUEST FOR RECONSIDERATION

### Support.

Support for the addition of the words “more than” in the claims is found on page 6, line 15. In one embodiment, described there, “not more than” 10 mole percent of substituents have the specified molecular weight. Therefore, in another embodiment “more than” 10 mole percent will have the specified molecular weight.

### Response.

The amendment to the specification is submitted to provide more explicit support for the numerical limit in the claims, which was previously present implicitly and inherently.

The claims were rejected as anticipated by or made obvious by Diana et al. (US 5,936,041), alone or (for claims 17-24 and 26) in combination with Steckel (US 5,053,152).

The amendment to the claims, to specify that the lower limit in terms of the low molecular weight substituent is more than 10 mole percent, serves to distinguish the claims from the disclosure of Diana. Diana discloses improved lubricating oil dispersants wherein a fractionating polymer is prepared prior to functionalization for making dispersant additives. The functionalization of the polymer can be carried out by, e.g., reacting the polymer with an unsaturated carboxylic acid producing compound. Less than about 10 mole % of the chains in the polymer should have a molecular weight of less than 500, and preferably less than about 5%, more preferably less than 3%. The functionalized polymers can be derivatized by reacting with various diamines.

The compositions of the amended claims are distinguished from the materials disclosed in Diana for at least two reasons. First, the claims as amended specify that the amount of low molecular weight polymer chains is now defined as “more than 10 to about 20 mole percent.” This is plainly distinct from the “less than about 10%” disclosed in Diana. Moreover, there is no motivation to move from the prior art “less than about 10%” to “more than 10 to about 20 mole percent.” The 10% limit in Diana is an upper limit, and the preferred ranges are considerably lower, indicating that any higher values are particularly disfavored. There is no potential advantage disclosed in Diana for using compositions with any higher values, and indeed, Diana’s advantages of improved dispersancy are suggested only at the lower values. Hence, the present claims are neither anticipated nor made prima facie obvious by the disclosure of Diana.

In addition, it is noted that claim 29 specifies a lower limit of 15 mole percent of hydrocarbyl chains having the specified molecular weight. This value is significantly further removed from the teachings of Diana and is for that reason even more plainly novel and unobvious.

The secondary reference, Steckel, discloses the use of condensed amines in preparing dispersants. There is no disclosure of the use of acylating agents characterized in having more than 10 mole percent, and up to 20 mole percent, of the individual substituent chains thereon with a  $\overline{M}_n$  of less than 500, nor is there anything in the Steckel reference which, when combined with the Diana reference, would make such a feature obvious.

Conclusion.

For the foregoing reasons it is submitted that the present claims are novel, unobvious, and in condition for allowance. The foregoing remarks are believed to be a full and complete response to the outstanding office action. Therefore an early and favorable consideration is respectfully requested. If the Examiner believes that only minor issues remain to be resolved, a telephone call to the Undersigned is suggested.

Any required fees or any deficiency or overpayment in fees should be charged or credited to deposit account 12-2275 (The Lubrizol Corporation).

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

The amended paragraph on page 6:

The substituted succinic acylating agents are those which can be characterized by the presence within their structure of two groups or moieties. The first group or moiety is referred to herein, for convenience, as the "substituent group(s)" and is derived from a polyalkene. The polyalkene from which the hydrocarbyl-substituent groups are derived is characterized by a  $\overline{M}_n$  (number average molecular weight) value. Since the substituent as a whole is normally a mixture of individual chains of varying lengths, these substituent groups are characterized by having not more than 20 mole percent, preferably not more than 15 mole percent and most preferably not more than 10 mole percent of individual substituent chains with a  $\overline{M}_n$  of less than 500. In an alternative embodiment, more than 10 mole percent, and up to 20 mole percent, of the individual substituent chains will have a  $\overline{M}_n$  of less than 500, and in another embodiment, 15 to 20 mole percent of the individual substituent chains will have a  $\overline{M}_n$  of less than 500. Typically the substituent groups as a whole will have a  $\overline{M}_n$  value of 1000 to 10,000, preferably 1300, 1500, or 2000 to 5000. Most preferably the  $\overline{M}_n$  is at least 2000. In another highly favored embodiment, the substituent groups will contain not more than 5 mole percent of substituent groups which have a  $\overline{M}_n$  of below 300.

The amended claims:

1. (twice amended) A composition suitable for reducing engine sludge and degradation of elastomer seals comprising

a major amount of an oil of lubricating viscosity and

a minor amount of a nitrogen-containing dispersant wherein the nitrogen containing dispersant is a reaction product of

(I) a hydrocarbyl-substituted succinic acylating agent, wherein more than 10 to about 20 mole percent of the individual molecules thereof have a hydrocarbyl substituent with a molecular weight of less than 500; wherein the hydrocarbyl substituent is a polymeric species consisting essentially of olefin monomer units of at least 3 carbon atoms; and

(II) at least one polyamine, wherein the polyamine is

(a) a polyalkylene amine containing at least one H-N< group; or

(b) a condensate of (i) a polyalkylene amine containing at least one H-N< group with (ii) at least one alcohol containing at least one ether group, amine group, nitro group, or additional alcohol group;

wherein in said polyamine (a) or condensed polyamine (b) no more than about 20 mole percent of the molecules contain 6 or fewer nitrogen atoms.

28. (twice amended) A composition suitable for reducing engine sludge and degradation of elastomer seals comprising

a major amount of an oil of lubricating viscosity and

a minor amount of a nitrogen-containing dispersant wherein the nitrogen containing dispersant is a reaction product of

(I) a hydrocarbyl-substituted succinic acylating agent wherein the hydrocarbyl substituent is prepared from a polymeric species consisting essentially of olefin monomer units of at least 3 carbon atoms and wherein more than 10 to about 20 mole percent of the individual molecules of said polymeric species have a molecular weight of less than 500; and

(II) at least one polyamine, wherein the polyamine is

(a) a polyalkylene amine containing at least one H-N< group; or

(b) a condensate of (i) a polyalkylene amine containing at least one H-N< group with (ii) at least one alcohol containing at least one ether group, amine group, nitro group, or additional alcohol group;

wherein in said polyamine (a) or condensed polyamine (b) no more than about 20 mole percent of the molecules contain 6 or fewer nitrogen atoms.